REMARKS

Prior Art Rejections

The JP 2000-49387 ("JP '387") reference does not teach or suggest the present invention. The JP '387 reference purportedly discloses the use of a urethane as a high refractive inner resin layer in the production of a semiconductor light-emitting device. However, the urethane is obtained from a composition of metaxylylene diisocyanate and 4-mercaptomethyl-3,6-dithia-1,8-octane dithiol. The 4-mercaptomethyl-3,6-dithia-1,8-octane dithiol molecule has five sulfur atoms. Parts that are made of silver in an LED containing that compound are susceptible to blackening when they come into contact with such a high sulfur content material. Moreover, the reference describes the use of a separate and distinct sealant material (number 6 in the figure) that consists of an epoxy resin; and the urethane resin (number 7) is not described as a sealant. Thus, the reference provides no teaching or suggestion of the use of such a urethane resin as a sealant; and one of skill in the art would not have been motivated to use the claimed urethane in the manner contemplated by the instant claims.

Further, the JP '387 reference is not prior art as to the instant claims as it was published after the priority date of the present application. The JP '387 reference was published February 18, 2000, whereas the instant application claims priority to JP 2000-013786, filed January 24, 2000. A translation of the priority document is filed herewith. The priority document shows a urethane resin obtained by polymerizing a mixture of an aliphatic or alicyclic polyisocyanate and an aliphatic and/or alicyclic polyol as a sealant for LED, and it shows that the urethane resin

contains no sulfur atom and is superior in yellowing resistance as compared to conventional epoxy resins as used in JP '387.

Nor are the instant claims anticipated by EP 659790 or Yean et al. USPN 5,310,847. The references describe polythiourethane resins useful in lenses having a high refractive index.

Both EP '790 and Yean '847 describe thiourethane resins that have high sulfur content. EP '790 states that the urethane resin is formed by reaction with "a polythiol having at least 3 mercapto groups per molecule and a sulfur content of at least 40 wt.%." *Abstract.* Yean '847 likewise states that its urethane resins are formed by reaction with a polythiol monomer "through formation of carbamate links, wherein said reactive groups are –SH mercapto groups for at least 40% in number and are present in a proportion at least amounting to 45% by weight with respect to the molecular weight of said monomer." *Col. 2, lines 20-24.* Such polythiourethane resins, having substantial sulfur content, suffer the same drawbacks as those described above with reference to JP '387. Accordingly, neither EP '790 nor Yean '847 teach or suggest the polyurethanes of the instant invention. Reconsideration and withdrawal of those rejections is respectfully requested.

In EP 422836, a non-sulfur containing polyurethane resin is available only if a non-sulfur containing polyol is selected. All working examples in EP '836 use polythiol compounds. Moreover, the resins of, *e.g.*, EP '836 are described as useful in the manufacture of lenses. There is no teaching or suggestion that the resins would have, or would have been expected to have, the properties required of a sealant composition in an LED, nor is there any teaching or suggestion that they

would have the requisite sealant properties of the instant urethane resin sealants as now claimed.

Insofar as EP 836 and Kubota et al. USPN 5,637,156 relate to the instant invention, the references disclose little more than conventional urethane chemistry involving the reaction of polyisocyanates with polyols. Such references do not anticipate the invention as claimed as there is nothing within those references teaching one of ordinary skill in the art how to arrive at the claimed compounds.

Kubota '156 relates to a solar cell encapsulated by a transparent urethane resin. It purportedly describes polyurethane resin compositions for forming an insulating film suitable for fabricating an amorphous silicon solar cell utilizing a flexible substrate. However, there is nothing within the reference that teaches the fabrication of urethane resins useful as a sealer for the light-emitting or –receiving elements of the instant claims, nor is there anything within the reference teaching one how to fabricate resins having the specified properties. Thus, although the reference describes the fundamental concept of forming urethanes by reacting polyisocyanates with polyols, the reference does not describe the fabrication of urethanes having all of the claimed elements.

Further, the polyurethanes of Kubota are used to produce, *e.g.*, inks that are applied in thin layers. For example, the reference states: "The resulting resin composition was applied to the surface of the upper electrode by screen printing...." *Example 6, cols. 15-16.* In contrast, the present invention is concerned with the production of sealers by a molding technique. The "inks" of Kubota are necessarily compositions containing a large amount of volatile components such as solvents. Such compositions can only be applied in thin layers. In contrast, the resin and

composition for a sealer of the present invention is used for molding, or "cast polymerization." There is no suggestion that the resins of Kubota could or should be formulated into compositions suitable for molding.

Rejections Under 35 U.S.C. 112

Regarding the rejection of claims 1-4, applicants have canceled those claims and introduced new claims corresponding to substantially the same subject matter. Reference to the use of polyisocyanate compounds comprising an aromatic constituent has been clarified. The new claims incorporate certain limitations of canceled claim 5 to more specifically recite the polyisocyanate component of the urethane resin. *See, e.g.*, claim 26.

Regarding the rejection directed to the terms "derivatives of the polyisocyanates (i) to (iii)"; "a modified isocyanurate or prepolymer..."; and "its modification", applicants submit that the newly interposed claims are amply supported by the specification and obviate the outstanding rejection.

Regarding the rejection of claim 12 directed to polyisocyanates, diisocyanatobenzene and bis(1-isocyanato-1,1-methylethyl)benzene, the former does not appear in the claims and the latter has been amended to bis(1-isocyanato-1,1-dimethylethyl)-benzene.

Regarding the rejection of claim 7 and the use of the term "viscosity", new claims 38 and 39 obviate the rejection.

Applicants respectfully submit that the newly introduced claims obviate the outstanding Section 112 rejections. Accordingly, applicants respectfully request reconsideration and withdrawal of those rejections.

In view of the foregoing amendments and remarks, applicants respectfully submit that the instant claims are in condition for allowance, and request formal notification to that effect. If, however, the examiner perceives any impediments to such formal notification, applicants ask that the examiner call applicants' attorney at the number provided below. Such informal communication will expedite examination and disposal of the instant case.

Respectfully submitted,

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